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ABSTRACT

This technical report attempts to (1) provide information on issues and factors involved in analyzing extended degree costs; (2) provide brief explanation of how cost-related tools have been used in allocation of resources in similar degree programs; (3) indicate the types of information that are needed in making cost analysis of the extended degree projects; and (4) note some of the limitations of cost-related tools as they apply to on-going extended degree program development and decision-making. Cost approaches to the competency based education/extended degree at the following 11 colleges and universities are summarized: Empire State College, Florida State College, New College at University of Alabama, University of Massachusetts, Weber State College, Brigham Young University, Community College of Vermont, University of Wisconsin Independent Study, University of Georgia, University of Texas, and Oklahoma City University. (Author/SPG)

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INFORMATION AND ISSUES RELATED TO COST ANALYSIS OF COMPETENCY BASED EXTENDED DEGREE PROGRAMS

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Introduction

This technical report attempts to (1) provide information on issues and factors involved in analyzing extended degree costs, (2) provide brief explanation of how cost-related tools have been utilized in allocation of resources in similar degree programs, (3) indicate the types of information that are needed in making cost analysis of the extended degree projects; and, (4) note some of the limitations of cost-related tools as they apply to on-going extended degree program development and decision-making. Thus, this technical report hopefully performs an information transmission function of raising key questions and providing raw data that can be synthesized to provide answers in further discussions of cost-related problems in the UW-Extended Degree Network.

Calculating Costs

In order to cost-out the extended degree projects, some technical information and possibly some accounting techniques must be known and agreed upon. The cost analysis of the extended degree must provide systematic cost accounting data and make cost analyses for the determination of cost effectiveness relationships for various extended degree functions.

The cost analysis should be considered a facilitative mechanism in the decision-making process. As such, it should attend to (1) the major functions of the extended degree as they operate and influence the costing mechanism, (2) the function of coordination of the degrees as resources are allocated and expended; and, (3) the processing of cost-related information vital to the extended degree coordination operation.

The major features of the extended degree which are significant to the cost analysis include: (a) competency based systems of instruction as the basic unit of the instruction function, (b) instructional systems development which includes non-traditional designs, testing modifications, and implementations, (c) resource centers and all of their supporting functions for instruction; and, (d) the organization of the degrees so that they can be extended to non-traditional students in diverse off-campus settings.

Consequently, there should be three primary cost functions which are available to assist in the systematic allocation of resources to meet extended degree objectives.

1. A cost accounting function which provides baseline data for all program operations. This includes the cost associated with individual instructional systems, the total instructional program costs and the resource costs needed to support the instruction program.

2. A cost-effectiveness function which provides data for making judgments concerning the costs of alternative instructional systems and their effectiveness in achieving specified program objectives. These cost-effectiveness judgments of alternatives should include intersystem, intrasystem, and major extended degree evaluations.

3. A cost-benefit function which assists in making judgments with respect to the costs of the program and the benefits derived from the extended degree programs by both the individual and society. In terms of the extended degree, two principle impact products are definable: a competency based curriculum that can be extended to non-traditional students, to increase higher educational opportunities, and students graduated as competent citizens. The benefits derived from the extended degree by both individuals and society are important types of data to compare against the resources expended in the process of preparing non-traditional students for more functional life roles.

Cost Accounting Function

A difficult process that must be involved in calculating extended degree cost is the identification, categorization and calculation of resources needed to support the operations of the extended degree programs. The cost accounting function relates the staffing, plant, equipment, materials and service costs to the various elements of the extended degree. These costs may be categorized into two classes: developmental and operating.

Developmental costs are nonrecurring costs necessary to bring the extended degree programs into readiness for operation and all costs required in the process of phasing a system into operation. Operating costs include all recurring costs necessary to the on-going operation of the extended degree.

The cost accounting function serves to provide a baseline alignment of costs accrued as they relate to users within the extended degree program and the cost of operating the total program. The

basic idea is that resources are expended (translated into costs) to achieve extended degree objectives. Operating costs pose the greatest problems for the extended degrees. In order that operating costs can be utilized in meaningful cost comparisons, operating cost must be stated in some stated unit of time, like per hour, per week, per month, or per year.

In higher education, at most institutions the coin of the realm is credit hours. According to Hall and Jones (1976), a credit hour is money. X students in Y courses multiplied by three credits produces total credit hours. One way to get more money is to generate more credit hours. In some institutions the approach to increasing funds is by using CBE programs to add credit hours.

In the Medsker et al., (1975), "Economics of Extended Degree Programs" study, all unit operating costs average full-time equivalencies were defined as 30 semester hours for undergraduates and twenty-four semester hours for graduate students. In Medsker's study, expressed in dollar terms, the major determinants of direct instructional operating costs were average class size (or student/faculty ratio), and method of compensation (on-load versus overload or special rates).

This approach is similar to Meeth's (1974), approach which suggest that one way of viewing current operational cost of the extended degree curricula might be to assess the cost per student credit hour--based either on total faculty compensation or on faculty compensation plus departmental expenditures which comprise the total direct costs of the educational program. Meeth has also noted that an alternative way of dealing with current operational costs beyond the credit hour is to look at cost per student. The cost per student can be determined by dividing the total current institutional expenditure for an academic year by the average full-time equivalent student

enrollment.

Although the extended degree is in a competency based degree format, the decision has already been made to adjust extended degrees to fit the traditional measures of faculty workload and student requirements (i.e:, credits). Consequently, the extended degree still has the two options. It can possibly continue to use the credit hour as the coin of the realm, or, choose to focus on cost per student (with possible increased fees to the student per extended degree course). Somehow, however, the cost accounting function of the extended degree must be able to account for operational costs in a manner that enables the generated costs to be abstracted, compared, or contrasted to provide an inter-system analysis.

Initial cost accounting procedures for the extended degrees are especially difficult because of the "newness" of the network. The cost accounting function must serve cost estimating relationships. More traditional programs have the luxury of records of expenditures for previous college terms. The Extended Degree program does not, and sources of cost data are limited and not readily available. Consequently, information required in cost accounting such as:

(1) A record of expenditures for the college term

(2) Faculty salary data

(3) Faculty Load survey

1. Direct instruction

   a. On-campus teaching
   b. Off-campus teaching

2. Indirect instruction

   a. Preparation of course materials

b. Procurement and preparation of student contracts, other instructional apparatus and supplies
c. Grading assignments
d. Academic advising and counseling
e. Committee work

3. Research and Development

4. Administration

5. Organized field activities

6. Extension and Community or Public service

Full-time Equivalent Load of Faculty

Student Data

1. On-campus credit courses

2. Off-campus credit courses

3. Record of level of instruction for each student enrolled, i.e., a record of student credit hours classified by level

Course Data

Are not readily obtainable, but necessary for cost estimation.

Two interdependent decisions must by made in the process of cost estimating: (1) what sources to tap for the data required to make cost estimates; and, (2) what methods or techniques to use to estimate item or total system costs. (Sells, Hamerus, and McAbee, 1967).

Sells, Hamerus, and McAbee have noted the following sources of cost data for making cost judgments:

1. The assumptions of restraints which govern the cost estimate may come from fiscal agents or other experts. These should be made explicit for the benefit of the user.

2. A systems description and operational source will indicate the intended operations and actual operations of the system.

3. System sources outside the program may offer cost data on single systems considered by the program or costs on programs based upon general experience.

The above authors point out five basic cost estimating techniques that have been identified and utilized in varying costing systems.

1. Cost per unit: identifies an item or items within a system as a specific type and in a specific quantity.

2. Cost-to-cost relationship: estimates cost as a function (percentage) of some other items cost.

3. Non-cost-to-cost relationship: estimates an items cost as a generalized average relationship.

4. Specific analogies: estimate item cost based upon some analogous relationship to a prior similar system.

5. Expert opinion in some speciality: provides the cost analyst with an estimate of the cost of a specific item or interrelated items.

Harris (1962), has developed an interesting formula which determines the cost of instruction:

1. Number of students (N) times semester student load in credit hours (L) equals total student credit hours.

2. Average class size (C) times average semester credit hours taught by teachers (F) equals average student credit hours taught by each teacher.

3. Total semester student credit hours divided by average credit hours taught by teachers equals number of teachers.

4. Number of teachers times average academic year salary of teachers (S) equals total teachers salaries.

5. Total year's expenditure less teacher's salaries equals overhead on teacher's salaries.

6. Overhead expressed as a relative of salary equals overhead divided by salaries (O) (Overhead stands for all costs other than salary).

7. Thus, $\frac{(NL)}{(CF)} S (1+O)$ = Cost of Instruction

Perhaps unfortunately, due to the uniqueness and newness of the extended degrees, even this relatively simple formula is not applicable.

The formula is included here because it readily illustrates (in a somewhat summarized fashion) the critical curricular variables that are related to each other and to the cost of instruction in most traditional higher education institutions. Consideration of the above variables and other factors related to the cost accounting function of the cost analysis of the extended degree result in many questions which need to be discussed and answered. The following questions, for example:

1. On students:
   - How many students?
   - How large should an extended degree enrollment be?
   - What about average class size?
   - How individualized will the extended degree be?
   - What will be considered an average student credit load in the extended degree?

2. On credits:
   - Are credit hours which traditionally (according to Medsker) represent "a rather systematic relationship to weekly student-contact hours" comparable at all to credit hours which do not relate to face-to-face contact but instead, relate to demonstrated competencies which conceivably could be developed or demonstrated without any face-to-face contact with faculty?
   - Should tuition or fees be charged for credit which is awarded by some form of assessment or should fees be limited to only credit offered directly by an institution?
   - What is a credit hour in the CBE/Extended degree?
   - If the credit hour of the extended degree program is actually not the same as the traditional credit hour, is it possible to make accurate cost comparisons using it as the measurable unit for operating costs?

3. On Faculty:
   - If faculty workload is usually the teaching load measured in credit hours...if the extended degree credit hour is not an equivalent...how do we measure faculty workload?

If faculty productivity is the number of student credit hours produced by faculty, will the extended degree increase or decrease faculty productivity?

How should faculty be compensated in the extended degree...released time or on-load compensation? Special rates or overload compensation?

To what extent will differences in cost relate to differences in faculty compensation?

Will the extended degree use substantial numbers of part-time adjunct personnel?

What will be the ratio of faculty to students in most extended degree programs?

Should extended degree programs be adjusted to fit the traditional measures of faculty workload (i.e., credit hour courses), or should new units of measurement which represent competencies be developed?

The Cost Effectiveness Function

The cost accounting function, already discussed, is aimed at providing the monetary value or estimated value of the resources expended in the extended degree program operations. Cost, from this point of view, is an incremental, time-phased expenditure supportive of program operations. Extended degree resources in various combinations provide support for achieving extended degree objectives. The alternatives may represent various systems, methods, or techniques capable of attaining the specified extended degree objectives. However, some combinations of resources provide a more effective array than others. Therefore, judgments must be made regarding alternatives and their estimated program effectiveness. (Sells, et al., 1967)

The cost effectiveness function is the process which attempts to

determine the most effective and efficient way of achieving the objectives of the extended degree programs. The objectives of the extended degree are stated in terms which will not close out possible resources mixes to accomplish them. However, the process of supporting the more generic aims with specific objectives is a critical operation. Not only must the specific objectives enable the generic aims to be accomplished, but they must lend themselves to some form of measurement, i.e., evaluation. It is this quantification of objectives which serves as the basis for determining the comparative effectiveness and cost of competing systems or resource alignments. The basic idea is to select the preferred alternative (combinations of resources) which maximizes system effectiveness and reduces system cost.

Diamond, Eickman, Kelly, Holloway, Vickery, and Pascarella (1975), have suggested the following as some indicators of improved cost-effectiveness. Many (but not all), seem to be indicative of an extended degree approach.

1. The Student:
   - Improved Learning - Same cost
   - Equal Learning - Less cost
   - Reduced Dropout (Failure) Rate
   - Improvements in Attitudes (toward subject/education/institution/society)
   - Reductions in Time Requirement
   - Increase in Credits Generated (options/content)
   - Increased Retention of Brighter Students (reduction in transfers)

2. The Faculty:
   - Increase in Faculty/Student Ratio (reduction of teacher cost per student)
   - Decrease in Time Requirement
   - Increased Specialization and Subject Offerings
   - Increased Direct Student Contact (at no increase in cost)

		Improvement in Faculty Attitude (toward student, course, department, institution)
3.	Instructional Space:	Decrease in Total Requirements Increased Student Capacity
4.	Instructional Resources:	Increase in Total Resource Utilization (resource use increase) Increase in Efficiency of Use (units reach more students)
5.	The Community:	Improved Attitudes Toward Institution Increased Number of Community Needs Being Met

This writer would conservatively suggest that at least fourteen of the above eighteen indicators would be a consequence of a UW-Extended Degree program.

Similarly, Greenhill (1972), listed the following indicators which should be considered when evaluating cost-effectiveness.

1. Same costs, but improved quality (e.g., fewer drop-outs, improved learner competencies, improved attitudes toward course).
2. Handle more students at same cost.
3. Cover more material (which is learned) in same time.
4. Cover same amount of material in less time.
5. Make more efficient use of space.
6. Have students with lower or more varied input competencies reach desired level of performance.

Again, the indicators seem to coincide with the objectives of the UW-Extended Degree programs. If the extended degrees meet their objectives, they should be highly cost-effective.

Caffarella (1975), has suggested that there are some problems with current cost-effectiveness methodology. At present, cost-effectiveness can be determined by measuring the costs while holding

effectiveness constant, or by measuring the effectiveness while holding the cost constant. A methodology needs to be developed such that both costs and effectiveness can be measured simultaneously.

The following formula was designed to compare the cost of one instructional system to another. Currently, in use at Michigan State University, the formula defines cost on a "one-year/learner hour produced basis".

Basic Formula

(Office of Educational Development
at Michigan State University, 1973)

$$C^{+}M = \frac{f\left(\frac{E}{A_1}\right) + f\left(\frac{F}{A_2}\right) + f(M) + f(U) + f(O) + f\left(\frac{S}{A_3}\right) + (C)}{L_h}$$

$C^{+}M$ = Cost ($) of a training medium for one year/learner hour produced

E = Total Estimated Cost

F = Cost of Facility

A_1 = Years Amortized

A_2 = Years Amortized

A_3 = Years Amortized

M = Maintenance for one year

U = Utilities for one year

O = Operating Personnel for one year

S = Software Costs (total including personnel)

C = Prepare Software for Computer

L_h = Learner Hours Produced

This formula has the following limitations: (1) Major elements are not included (e.g., development costs, learning, etc.), (2) By tending to stress the student-faculty ratio, the approach favors less

individualized, large-group formats of instruction.

Gallup (1974), has developed two models that may be useful in determining extended degree course effectiveness. These two models are referred to as the Gallup Evaluation Model I (GEM Model I) and the Gallup Evaluation Model II (GEM Model II). The first model assesses course effectiveness on an achievement basis, while the second model utilizes attitude as a measure of effectiveness. Both of these models take into consideration the interaction between most of the variables listed by Greenhill (1972), mentioned above as criteria to evaluate cost-effectiveness.

GEM Model I: Achievement Basis

Total Course Effectiveness (E_2) = Effectiveness of Alternative I (e_1) + Effectiveness of Alternative II (e_2)

e_1 = Achievement per Time per Cost per Student

$$= \frac{\text{Achievement per Time}}{\text{Cost per Student}}$$

$$= \frac{\text{Achievement } (A_1)}{\text{Time } (T_1)} \div \frac{\text{Cost } (c_1)}{\text{No. of Students } (S_1)}$$

$$= \frac{(A_1)}{(T_1)} \div \frac{(C_1)}{(S_1)}$$

$$= \frac{(A_1) \times (S_1)}{(T_1) \times (C_1)}$$

e_2 = Achievement per Time per Cost per Student

$$= \frac{\text{Achievement per Time}}{\text{Cost per Student}}$$

$$= \frac{\text{Achievement } (A_2)}{\text{Time } (T_2)} \div \frac{\text{Cost } (C_2)}{\text{No. of Students } (S_2)}$$

$$= \frac{(A_2)}{(T_2)} \div \frac{(C_2)}{(S_2)}$$

$$= \frac{(A_2) \times (S_2)}{(T_2) \quad (C_2)}$$

WHERE:

A_1 and A_2 = the total difference between pre- and posttest scores on a standardized achievement test.

T_1 and T_2 = the total amount of time students spend on course instruction, both in and out of class.

C_1 and C_2 = the total operating costs of a method.

S_1 and S_2 = the total number of students completing both pre- and post-standarized achievement tests.

In GEM Model I, the effectiveness of a course alternative (e_1 or e_2) may be viewed as the achievement gained in an alternative multiplied by the number of students enrolled in an alternative, divided by the product of the time students devoted to instruction, multiplied by the costs of offering an alternative, or:

$$e_1 = \frac{(A) \times (S)}{(T) \times (C)}$$

For the purposes of GEM Model II, the variables used in determining effectiveness on an "attitude" (A_t) basis, are the same as those employed in the determination on an "achievement" (A) basis with the exception of the achievement variable. The achievement variable (A) is eliminated and replaced by an attitude variable (A_t). The value of this variable is the total positive score obtained by students on a standardized course attitude survey administered upon course completion.

In the GEM Model II, the effectiveness of a course alternative (e_1 or e_2) may be viewed as the total positive attitude in an alternative multiplied by the number of students enrolled in an alternative, divided by the product of the time students devote to instruction, multiplied by the costs of offering an alternative, or:

$$e_1 = \frac{(A_t) \times (S)}{(T) \times (C)}$$

Gallup offers the following conclusions regarding GEM Models I and II.

1. The models are workable procedures for the evaluation of two methods of teaching the same course content.

2. The models are only one instrument in the evaluation process.

3. The models examine and take into consideration factors of educational effectiveness and efficiency. Utilizing the variable of amount of pupil time, costs of offering a course, and student attitude in the evaluation process, a basis may be established for making decisions involving the most efficient and effective method of course instruction.

4. The models may be used for predicting effectiveness of outcomes during a recycling of the course development process.

5. The models may only be used to interpret those variables which were in existence at that point in time when the formative evaluation occurred.

6. The models should only be used when both methods for teaching the same course content have as their overall goal the same basic objectives.

A major and critical question that is raised in the cost-effectiveness function of the cost analysis of the UW-Extended Degrees is, "Is the competency based education approach cost-effective in relation to traditional non-CBE approaches to higher education instruction?" Enos (1976), conducted a study in 1975 at San Diego University to answer the question.

Enos conducted a cost-effectiveness study of a competency based teacher education program and a non-competency based teacher education program. The data generated by his study indicate that a competency based education program can constitute a significant improvement over traditional programs of teacher education. The competency based program was worth the dollar cost as well as the considerable effort involved. Cost data were presented for interested administrators and policy makers to utilize when considering the acceptance or rejection of the competency based model. The competency based approach was "at least" $1,044 per student more cost-effective than the non-competency

based program. The CBE program provided an additional $5,097 to $15,097 in benefits for each student who was matriculated.

The Cost-Benefit Function

What are the costs of the extended degrees as they relate to the benefits derived from the programs by professors, students and the public? Benefits from an extended degree program are likely to accrue over time in a particular pattern; however, the costs of such a program will probably have a different pattern. Therefore, to make a comparison of costs and benefits, it is necessary to develop a methodology which will permit the summarization of costs and benefits over time. By discounting future costs and benefits, one arrives at a present commensurability of costs and benefits. Therefore, the ratio of the present value of future costs to the present value of future benefits is termed the cost-benefit ratio. (Davie, 1965). As a rule of thumb, unless the cost-benefit ratio for a particular program is less than one, that program should doubtfully be undertaken. However, this is assuming that all costs and benefits are quantifiable, i.e., commensurable. Usually, the lower the cost-benefit ratio the more desirable the program. (Sells, et al., 1968.)

In the extended degree programs, however, there are extensive intangible benefits which need to be included in considerations of the cost-benefit analysis of the extended degrees. These cannot usually be included in a formal quantification analysis. Some such intangibles might include judgments made with reference to the appropriate competencies the extended degrees attempt to develop in non-traditional students, or the impact of the students on society as a result of developing specified capabilities engendered, directly

or indirectly, by the program. These types of judgments seem almost beyond any quantification attempts, but they need to be identified and evaluated within the decision-making context. Sells, et al., (1968), suggest that another cost benefit approach may be advised; the benefits may be treated as an unknown (unquantifiable) in the equation while the estimated costs of the program are known. The task, then, is to assess the projected benefits in terms of future return to the individual or society as compared with the extended degree program costs.

Individuals Cost-Benefit Ratio

In traditional higher education, the educational process is conducted by bringing students and colleges together. The costs are of two classes: (1) those needed to get the students to college and keep them there; and, (2) those used to operate the educational institutions. The total cost is the sum of these two. (Bowen and Douglas, 1971).

Bowen and Douglas have presented hypothetical, (but fairly realistic) data on the typical economic cost of educating one student in college for one year. They suggest that the costs assignable to the student are on the order of $4,600 a year; and the costs assignable to the college (to instruct him and to provide an environment conducive to his/her education) amount to about $4,000. The sum of the two, or the toal cost, is $8,600. These authors point out, "if in the quest for efficiency only the college portion is considered, the result is certain to miss the mark."

Bowen and Douglas also note that the largest portion of the cost assignable to the student is foregone earnings. This cost arises from the fact that if the student were not in college, he/she would probably

be in the labor force. The individual sacrifices out-of-pocket costs needed for tuition/fees, transportation, housing/food and other items associated with student life. The above authors have indicated that by attending college, young students give up incomes averaging $3,900 a year or more. The clientele of the extended degree, non-traditional adult students would possibly have to give up four to five times that income amount.

Each hour of each eighteen year-old student's time claimed by a college is estimated to be worth around $3.60. Educators, in trying to achieve efficient methods, have long considered the time of students as one of higher education's inputs along with salaries, building costs, equipment, supplies, etc. Many examples, however, suggest that the incentive to save institutional dollars has been stronger than the incentive to save student costs and time.

Bowen and Douglas have noted that once the value of student time is considered, two conclusions emerge: (1) when both institutional and student costs of education are counted, the total outlay is so great that nothing short of superb outcomes from the educational process can be justified or tolerated; and, (2) the least costly method of instruction from the point of view of the college budget may not be most efficient when student time is considered. Trade offs between institutional costs and student cost and time are undoubtedly possible. However, again, the rule of thumb says that the benefits should outweigh the costs to make the individual student's participation in a educational program desirable.

The individual's cost-benefit ratio raises important questions for the extended degrees to consider. For example, in seeking to attract a new non-traditional adult extended degree clientele, what

are the justifiable tuitions and fee levels compared to student private cost savings in the form of foregone earnings? Or, more simply, should the extended degree (because it probably will cost more to operate initially), charge the student higher than traditional rates, (because the student will actually save in terms of foregone earnings in both the short and long run)?

Societal Cost-Benefit Ratio

From society's point of view, the cost associated with the extended degree programs, include such out-of-pocket items as subsidizing the operation of the programs through university monies granted and appropriated. The opportunity costs, in the societal context, are quite difficult to account for (in a quantitative aspect) because of the supply/demand concept operating within the economy, i.e., given an open manpower base, the supply of prospective personnel is channeled to the demand areas or to that sector of the economy in most need of similar personnel. (Sells, et al., 1968)

Evidence on the rates of return to investments in higher education indicate that nationally the saturation point in quality and enrollment have not yet been reached. Careful studies indicate that investments in higher education are producing a return in enhanced income of students of nearly 15 percent annually. (Becker, 1964). Although, this rate of return appears to be substantially higher than that from investments in ordinary capital, the extended degree concept could very well serve to substantially increase the rate of return for a greater number of students. If this is so, efficiency calls nationally for still greater investments in educational quality, in expanded enrollments, and in extended degree approaches. (Bowen and Douglas, 1971).

Cost Analysis

Cost analysis is a general term used to describe a three-part concept composed of cost accounting, cost-effectiveness and cost-benefit. Meeth (1974), states that it is essentially a six-step procedure:

(1) Collecting and grouping all direct resources and related dollar costs reduced to the smallest unit of measure applicable to the program being studied.

(2) Examination of output or accomplishment of objectives of the unit being measured.

(3) Relating of the resources and their dollar value to the outcomes or the extent of accomplishment of objectives determined for the program unit.

(4) Comparing the ratio of resources to outcomes from one program to another.

(5) Acknowledgement of the programs with the greatest and the least cost-benefit based on ranking between alternative methods of achieving the same outcome for different values in the same program unit.

(6) Implementation of the least expensive procedure for achieving the desired objectives, so that the theoretical cost benefit can become a real benefit to the institution.

Some Cost Approaches to the CBE/Extended Degree

Empire State College

Empire State College was established within the State University of New York as SUNY's effort to "discover whether alternative approaches to higher education can more flexibly serve the needs to individual students, while maintaining quality and educational effectiveness comparable to that available to a student at a traditional campus." (see Empire State College Bulletin, 1973-74).

After a review of existing programs for systems of cost-effectiveness

was made, Empire State decided that it was necessary to develop a cost-effectiveness model of its own. Nowhere were they able to locate programs which had systems of cost-effectiveness to meet the effectiveness requirements they had set for themselves. (Debus, 1975).

The basic unit of analysis of the costing model is the individual student contract. The costing model assigns to each contract its share of all costs--both direct and indirect. Most elements of cost are gathered in cost centers by the commonly accepted definitions. However, there are four elements of costs which differ significantly from existing costs models.

1. The ESC model requires assigning a value for all in-kind contributions of services, materials, facilities, and programs of others.

2. Developmental and access costs are treated on a deferred asset basis rather than charged in the year paid.

3. Appropriate portions of faculty salaries devoted to general institutional administration are assigned as general overhead rather than as a direct instructional cost.

4. Institution-wide average salary figures are used as the basis of contract assignment rather than actual salaries.

In addition, the ESC model takes into consideration student's foregone earnings and the contribution made to society because of the ESC experience.

The contract costing tool is designed with indexing sufficient to enable accumulation of costs by the more familiar reporting systems such as FTE, credit hour, etc., but--more importantly--provides cost data accumulations related to such matters as individual students, delivery systems, student characteristics, length of learning experience, and location of experience.

The costing model is intended to enable decision makers to assess an almost unlimited range of things such as:

-- Does a program of learning prove equally as effective in each geographic location at what cost variations?

-- Are educational outcomes equally effective in each geographic location at what cost variations?

-- Are educational outcomes equally effective when students employ mentor/student; mentor-tutor/student; coordinator/student; coordinator-tutor/student relationships at what cost variations?

-- Are there cost variations due to program of learning, prior experience, learning modes utilized, personal relationships, geographic location, etc.?

(The above comments of Mr. Debus, Director of Cost Studies, Empire State College, are excerpted from Appendix A).

The initial costing model of ESC has been refined and is now referred to as The Program Evaluation and Related Costs Model (PERC). PERC seeks to relate educational outcomes and costs to three major sources of variation: students, programs, and faculty. Heavy emphasis is placed on the interaction of variables arising from these three sources and on tracing evidential networks to account for variations in outcomes and costs. The overall question toward which the model directs attention is "What kinds of students working in what kinds of learning programs with what kinds of faculty change in what ways at what cost?" (UW-Green Bay, 1976; also see Appendix C).

Florida State University

Florida State University sought to justify its attainment-based, time-variable curriculum program which is to be instituted full scale in that university's system on the basis of its "comparative cost-effectiveness." A cost study was conducted in which comparative cost-effectiveness was expressed in terms of "cost parity" with the

conventional system.

In this effort, Florida State University decided to take a more limited approach than a "full costing" approach, because: (1) the costs associated with making an accurate full costing analysis are virtually prohibitive; and, (2) since the FSU Curriculum of Attainments (COA) is offered as a "peacefully co-existing" alternative to the conventional system, the most relevant basis for comparison is the relative productivity of student credit hours (SCH) between two analogous programs, given the manner in which funds are generated for university operation in Florida's State University System. (Fisher, 1976).

The costing approach which was selected was as follows: The number of student credit hours (SCH) earned by students in the conventional system per term is divided by the number of full-time equivalent faculty members (FTE) in the respective departments in the conventional curriculum. This yields a SCH/FTE rate.

The same procedure is followed in the COA program. The number of SCH generated is divided by the FTE necessary to generate them. The FTE rate is determined by adding one (1) FTE for the mentor and a determined FTE level to allow for tutor and juror services provided by other staff members. This FTE factor is then divided into SCH for the COA program to derive a SCH/FTE rate for COA.

When the two SCH/FTE rates for conventional and COA programs are derived, they are compared directly as a ratio of [COA SCH/FTE/ Conv. SCH/FTE]. The resulting product is the parity rate, and a rate greater to or equal to one (1) is desirable. (The preceding is taken from Fisher's Cost-Parity Analysis, Appendix B).

New College at University of Alabama

At New College an interesting approach is taken in the area of "credits". There is a general guideline in the college that approximately 10-15 hours of work per week is necessary for receiving three semester hours credit.

In determining credit hours three factors are kept in mind: (1) the duration of the experience; (2) the depth of experience; and,(3) the quality of the experience. The typical range of credit for "out-of-class" learning experiences is one to six hours of credit for experiences done while in other courses and six to twelve hours for experiences done on a full-time basis during a particular semester.

The University of Massachusetts

According to Houston and Howsam, the University of Massachusetts has equated a standard university "credit" into fifteen modules per credit. A student registers for a cluster of modules, not courses, to complete his or her program.

At least two difficulties arise in this practice of equating a certain number of modules with an existing course. First, unless a large number of modules are available, a student who pretests out of certain modules, or portions of modules, may complete early and find himself with no course for the remainder of the semester. Second, interdisciplinary cooperative efforts are likely to generate interdisciplinary modules that cannot be classified under existing courses.

Weber State College

At Weber State College, a student completing a module during a

semester is allowed to start another WILKIT (i.e., a module, usually of 5 to 30 hours work and worth one half to one quarter hour of credit). Because they pay for credits in blocks, students have options in their programs that are separate from course registration. Weber State utilized a credit-no credit grading system and accounted for faculty time by dividing total student credit hours by the number of faculty.

Brigham Young University

In the Brigham Young University ISTEP program, the student receives credit only upon completion of the entire program. Brigham Young University allows one and a half years to complete its program and requires that the first semester be devoted exclusively to the requirements of ISTEP.

Community College of Vermont

A degree or certificate is granted on the basis of competency. When credits are required, CCB applies a formula to arrive at semester hour equivalents. The CCV formula is based on the guidelines of the Carnegie unit and semester-hour equivalents are arrived at using: fifty minutes of instruction in class for fifteen weeks equals one credit. One hundred fifty contact hours per term is considered full-time attendance for administrative purposes. Students are allowed to complete work on unfinished competencies up to six months from the end of a regular course period. (CCV, Spring 1976 Bulletin).

In developing its approach to individualized education models, CCV made a cost-effectiveness projection, in terms of the costs to the institution in directly supporting students regardless of

administrative overhead and services (e.g. maintaining student records, processing evaluation forms). Therefore, the projections were made by taking an average hourly wage of the salaries paid to the learning support staff of the college and figuring an average amount of time spent with students and instructors in support. In addition, the amount of money collected in tuition, based on 100% collection, and amount of money paid out in teacher pay, were calculated into the projection. The formula devised to determine each projection was:

Cost/hr in Support Staff	+	Instructor Cost	=	Gross Cost	-	Tuition	=	Net Unit Cost

(Wade, 1976)

University of Wisconsin Independent Study

Charges varying fees for each course taken, exclusive of textbooks costs and a service charge fee.

The University of Georgia

The University of Georgia Model Program developed the Student Effort Unit (EU) for establishing credit. An EU is defined as a quantitative approximation of the amount of effort required of an average student to acquire a defined set of competencies. The equivalents for an EU are defined as follows:

1	EU	= 2 clock hours of student effort
10	EUs	= 1 quarter hour of credit
15	EUs	= 1 week of effort (30-45 hours)
150	EUs	= 1 academic quarter (10 weeks of work (or 15 quarter hours of credit)

In turn, this system can be converted to a semester hour equivalent by multiplying by a factor of 2/3. That is 10 EUs = 1 quarter hour = 2/3 semester hour.

The University of Texas

The Research and Development Center for Teacher Education developed a monitoring system for large-scale programmatic research and development efforts that can easily be adapted to the needs of CBE program manager. (Wallace and Witzke, 1972). The composite system has been named the General Accounting System or GAS, and was developed to systematically monitor and estimate the time, resources, and dollar costs of R & D in order to have a data base on which to plan and cost out future R & D efforts. Using the entire system requires adjusting the budget reporting and purchasing procedures, as well as, enlisting the cooperation of personnel involved.

Each member of the staff is asked to maintain a Labor Accounting Form (LAF) on which he or she reports the time spent on different tasks that are the major subdivisions of the project effort. The kinds of activities that staff might be doing are listed as work functions. For each time interval, an hour, a half hour, etc., a work function is assigned to a task. Each staff member categorizes his day's activities according to agreed upon work functions and tabulates the amount of time spent on a particular work function for a particular task. Based on this type of data, the average cost per man-hour of effort can be calculated.

Oklahoma City University

The Competency-Based Degree Program (CBDP) is an optional second

degree structure at Oklahoma City University offering selected students an alternative means of obtaining a Bachelor of Arts or Bachelor of Science degree. The CBDP differs from the traditional degree structure in that the criteria for awarding the degree are the achievement and demonstration of competency rather than the accumulation of a designated number of credit hours and designated courses.

To earn a CBDP degree, students fulfill the specific requirements detailed in a Degree Contract. The CBDP does not use the usual "credit hour" approach. Instead, the cost of a student's program is charged by the competency area. In the CBDP, there are seven Liberal Arts Competency Areas and an Area of Concentration. The Area of Concentration is four times any individual Liberal Arts Competency Area in both the amount of work required and cost.

There are three ways a competency area may be completed. Each way differs in the time and energy the university is required to give, and therefore, the tuition it must charge the student.

1. Traditional College Learning Experience: Transfer of credit from another university and CLEP tests no charge.

2. Non-Traditional Prior Learning Experiences: Credit not previously granted by another college must be assessed by OCU faculty and is therefore, charged at a rate of $200 per Liberal Arts Competency Area, or a percentage thereof. Since the Area of Concentration represents four times the work and effort of a Liberal Arts Competency Area, the rate would be $800 for the Area of Concentration, or a percentage thereof.

3. Learning Contracted for While in the Program: The previous two ways of completing a competency area have dealt exclusively with prior learning experience (PLE). After entering the program, the student contracts with the university for his/her learning and subsequent credit. In this case, the university is expending far more of its resources on behalf of the student than with the prior learning, where the actual learning has already taken place. The total charge for learning contracted for in CBDP is $550 for each Liberal Arts Competency Area and $2,200 for the student's Area of Concentration.

Minimum Cost:

The actual cost of any individual student's degree program will obviously vary depending on the amount of prior learning experience credited and how that prior learning was achieved. A minimum cost for a degree through the CBDP has been set as $1,000. This minimum cost is not paid in addition to the costs described above, but is what the student would pay under the formula described below if tuition would not equal $1,000.

Tuition formula:

Tuition = 200a + 5506 + 800c = 2200d

a = percent of Liberal Arts competency area or areas attained through non-traditional prior learning experience

b = percent of Liberal Arts competency area or areas contracted for in CBDP.

c = percent of Area of Concentration attained through non-traditional prior learning experience

d = percent of Area of Concentration contracted for in the CBDP

Other information on Fees:

At enrollment, student deposits minimum tuition deposit of $1,000 which is forfeited at the end of six months if not obligated in a contract. The student is refunded a portion of the $1,000 dollar fee if he decides to withdraw within the first three months of the program. A fee of $250 is deducted from the $1,000 minimum fee for each month the student is in the program up to three months. No refund is made after the three month withdrawal period.

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APPENDIX

A. Cost Analysis For Contract Learning

B. Cost-Parity Analysis

C. Multiple Perspectives Evaluation

D. Is CBTE Cost-Effective?